USC Viterbi School of Engineering

Video Game Programming

ITP 380 (4 Units)
Fall 2016

Objective	This course provides students with an in-depth introduction to technologies and techniques used in the game industry today. At semester's end, students will have: 1. Gained an understanding of core game systems (incl. rendering, input, sound, and collision/physics) 2. Developed a strong understanding of essential mathematics for games 3. Written multiple functional games in C++, both individually and as a team 4. Learned critical thinking skills required to continue further study in the field
Concepts	3D math for games. C++. 3D graphics. Collision detection. Introduction to A.I. Implementing gameplay. Working with Unreal 4. Getting a job in the game industry.
Prerequisites	CSCI 104 or ITP 365x
Instructor	Sanjay Madhav
Contact	Any questions related to the course and material should be posted on Piazza. *Email:* madhav@usc.edu (Only for non-course questions or prospective students).
Office Hours	M/W 4:30-7PM in OHE 530H
Lab Assistants	TBD
Time/Location	Monday and Wednesday, 2 – 3:50PM in OHE 540
Course Structure	The first ~10 weeks of the semester will be broken into two week segments. Most segments have three lectures. Each segment will have a corresponding two-week lab assignment in which students will implement parts of different games. These lab assignments should all be completed individually. Upon conclusion of the fifth lab assignment, students will break into groups of 3 students and work on a 5-week long final project. This project will be a culmination of the material students have learned during the semester, and the goal is that you will have a working prototype that can demonstrate your technical skills. There is a midterm exam, but instead of a final exam, there's a final project.
Textbook	*Game Programming Algorithms and Techniques.* Sanjay Madhav. ISBN-10: 0321940156. (Amazon link)
Grading	The course is graded with the following weights: Lab Assignments (5 x 8%) 40% Final Project 35% Midterm Exam 25% TOTAL POSSIBLE 100%
Software	Students will be able to setup their own PC and/or Mac computers for use in the class. For the first half of the semester, students will be writing code in C++ using a simple game framework designed for this course. In the second half of the semester, we will use Unreal 4 (which is free). ITP also offers Open Lab use for all students enrolled in ITP classes. These open labs are held beginning the second week of classes through the last week of classes. Hours are listed at: http://itp.usc.edu/labs/.

Grading Scale

Letter grades will be assigned according to the following scale:

93%+	A
90-92%	A-
87-89%	B+
83-86%	B
80-82%	B-
77-79%	C+
73-76%	C
70-72%	C-
69	D+
67-68	D
66	D-
65 and below	F

Half percentage points will be rounded up to the next whole percentage. So for instance, 89.5% is an A-, but 89.4% is a B+.

There is no curving. Students will receive the grade they earn. Extra credit is generally not offered.

Group Project

Starting in Week 11, students will break into groups of 3 to work on a larger 3D game of their own design. Before commencing work on their project, students must have their proposed game approved by the instructor. Working on a project which is not approved is not allowed.

The primary learning objectives of this project are two-fold: first, we expect you to apply and expand your knowledge of gameplay programming. By the end of this project, every team member should be confident and knowledgeable regarding a wide range of aspects of how gameplay code works.

Second, as this is a fairly lengthy project (~5 weeks in length), the other primary learning objective is to learn the process of how to manage group projects of longer duration. Specifically, we will utilize Agile/Scrum and the online task board Trello. This will give students "real world" game development experience.

Much greater detail on how the project is graded, as well as the weekly schedule will be provided in the lab guide available on Blackboard.

Policies

Make-up policy for exams: To make up for a missed exam, the student must provide a satisfactory reason (as determined by the instructor) along with proper documentation. Make-ups are only allowed under extraordinary circumstances.

Late Lab Assignments: Lab assignments will be accepted late with a 15% penalty per day late, up to three days late. Assignments more than three days late will not be accepted.

The final project will *not* be accepted late. It will be graded based on the submission at the required time of presentation.

Statement on Academic Conduct and Support Systems	**Academic Conduct** Plagiarism – presenting someone else's ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, http://policy.usc.edu/scientific-misconduct/. Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* http://equity.usc.edu/ or to the *Department of Public Safety* http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* http://www.usc.edu/student-affairs/cwm/ provides 24/7 confidential support, and the sexual assault resource center webpage sarc.usc.edu describes reporting options and other resources. **Support Systems** A number of USC's schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* http://dornsife.usc.edu/ali, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information http://emergency.usc.edu/* will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.
A Further Note on Plagiarism	In this class, all homework submissions will be compared with current, previous, and future students' submissions using MOSS, which is a code plagiarism identification program. If your code significantly matches another student's submission, you will be reported to SJACS with the recommended penalty of an F in the course. It is okay to discuss solutions to specific problems with other students, but it is not okay to look through another student's code. It does not matter if this code is online or from a student you know, it is cheating. Do not share your code with anyone else in this or a future section of the course, as allowing someone else to copy your code carries the same penalty as you copying the code yourself.

Course Outline			
W	**Date**	**Topic(s)**	**Reading/Labs**
1	8/22	Course Intro; Game Programming Basics	Ch. 1;
	8/24	Graphics Basics	Ch. 2 (pp. 19-22); Ch. 3 (pp. 58-61); Ch. 4 (pp. 65-75)
2	8/29	Vector Math and Physics Basics	Ch. 3 (pp. 41-29); Ch. 7 (pp. 148-151)
	8/31	Lab Session – Finish Lab 1	**Lab 1 DUE 9/2 @ 11:59PM**
3	9/5	**No class – Labor Day**	
	9/7	Input and Sound	Ch. 5; Ch. 6;
4	9/12	More Vector Math	Ch. 3 (pp. 50-57); Ch. 4 (pp. 88-91)
	9/14	Lab Session – Finish Lab 2	**Lab 2 DUE 9/16 @ 11:59PM**
5	9/19	Artificial Intelligence	Ch. 9;
	9/21	More Graphics	Ch. 4 (pp. 76-88)
6	9/26	Camera Systems	Ch. 8;
	9/28	Lab Session – Finish Lab 3	**Lab 3 DUE 9/30 @ 11:59PM**
7	10/3	Industry Jobs; Midterm Review	
	10/5	**Midterm Exam**	
8	10/10	Collision and Game Physics, Part 2	Ch. 7 (pp. 127-148)
	10/12	Lab Session – Finish Lab 4	**Lab 4 DUE 10/14 @ 11:59PM**;
9	10/17	Unreal 4 Demo	
	10/19	Multiplayer Fundamentals	Ch. 12;
10	10/24	Final Project Introduction; Make Groups	
	10/26	Lab Session – Finish Lab 5	**Lab 5 DUE 10/28 @ 11:59PM**
11	10/31	Begin Sprint 1	Work on sprint tasks
	11/2	Continue Sprint 1	Work on sprint tasks
12	11/7	Continue Sprint 1	Work on sprint tasks
	11/9	Continue Sprint 1	Work on sprint tasks
13	11/14	Continue Sprint 1	Work on sprint tasks
	11/16	**Sprint 1 Presentations**; Begin Sprint 2	
14	11/21	Continue Sprint 2	Work on sprint tasks
	11/23	**No class – Thanksgiving**	
15	11/28	Continue Sprint 2	Work on sprint tasks
	11/30	Continue Sprint 2	Work on sprint tasks
		Final Project Presentations – Friday, December 9 @ 2-4PM	